

while not substantially influencing the magnitude of the magneto resistance effect of said first structure; and wherein

AB - said first ferromagnetic layer structure and said second structure respectively comprising an even or odd number of non-abutting ferromagnetic layers and an odd or even number of non-abutting ferromagnetic layers.

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### REMARKS

Claims 1-4 and 6-16 are pending. By this Amendment, claim 5 has been cancelled and claims 12, 15, and 16 have been amended. Reconsideration and allowance are respectfully requested in view of the above amendments and the following remarks. No new matter is believed added.

The drawings are objected to under 37 CFR 1.83(a) for failing to illustrate the "third structure" presented in claim 5. Claim 5 is rejected under 35 U.S.C. 112, first paragraph. Accordingly, claim 5 has been cancelled.

Claims 12 and 16 are rejected under 35 U.S.C. 112, second paragraph for including the phrases "such as" (claim 12) and "preferably" (claims 12 and 16). Accordingly, claims 12 and 16 have been amended for clarity.

Claims 1-4, 7, 8, and 13-15 are rejected under 35 U.S.C. §102(e) as being anticipated by Lin et al. (US 6,175,475), hereafter "Lin '475." Claim 16 is rejected under 35 U.S.C. 102(e) as being anticipated by Lin et al. (US 6,127,053), hereafter "Lin '053." These rejections are defective because Lin '475 fails to teach each and every feature of claims 1-4, 7, 8, and 13-15,

while Lin '053 fails to teach each and every feature of claim 16, as required by 35 U.S.C. §102.

Claim 1 recites:

“A data storage system comprising a set of structures including:

- a first structure of layers including at least a first ferromagnetic layer and a second ferromagnetic layer with at least a separation layer of a non-magnetic material therebetween, said first structure having at least a magneto resistance effect;
- a second structure including at least one magnetic layer, said second structure influencing at least one intrinsic magnetic characteristic of said first structure;
- and said second structure being separated from said first structure by at least a spacer layer, wherein the non-magnetic material is a metal and the spacer layer comprises a high-resistive metallic material and said spacer layer furthermore causing a mainly ferromagnetic coupling of said second structure on said first structure while not substantially influencing the magnitude of the magneto resistance effect of said first structure.”

Regarding claim 1, Lin '475 fails to teach, among other features, the claimed “spacer layer comprises a high-resistive metallic material and said spacer layer furthermore **causing a mainly ferromagnetic coupling of said second structure on said first structure** while not substantially influencing the magnitude of the magneto resistance effect of said first structure.”

On the contrary, Lin '475 teaches that the “second spacer” (which the Examiner has equated with the claimed “spacer layer ... of a high-resistive metallic material”) provides **magnetic isolation** (col. 5, lines 21-24) of the keeper layer 406 (which the Examiner asserts is part of the claimed “second structure”) from the free layer 410 (which the Examiner asserts is part of the claimed

“first structure”). Clearly, therefore, the Examiner’s statement (Office Action, page 4, first paragraph) that it is “inherent that the spacer layer causes a mainly ferromagnetic coupling of the second structure on the first structure” is contradicted by the teachings of Lin ‘475. Further, the Examiner has failed to provide any evidence supporting the assertion that the spacer layer of Lin ‘475 inherently causes a mainly ferromagnetic coupling of the second structure on the first structure.

Accordingly, Applicant submits that claim 1, and claims 2-12 that depend from claim 1, are allowable.

Regarding independent claim 14, Lin ‘475 fails to teach, among other features, the claimed “defining at least one layer of a high-resistive metallic material in-between said second structure and said first structure, and said layer of a high-resistive metallic material furthermore **at least partially inducing a crystallographic characteristic on said second structure.**” Lin ‘475 does not disclose that the “second spacer” induces any type of crystallographic characteristic on the keeper level 406. Accordingly, Applicant submits that claim 14 is allowable.

Regarding independent claim 15, Lin ‘475 does not disclose the tuning of a magneto resistance characteristic of a magnetic system specifically by “adjusting a thickness of the high-resistive metallic material” in the second structure. In particular, Lin ‘475 does not disclose the tuning of the magneto resistance characteristic, nor does Lin ‘475 recognize that such tuning can be accomplished by adjusting the thickness of the second spacer. Accordingly, Applicant submits that claim 15 is allowable.

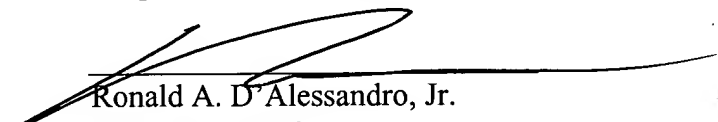
Regarding independent claim 16, Lin '053 does not disclose the claimed "spacer layer of a high-resistive metallic material" that influences the "coupling of said second structure on said first structure while not substantially influencing the magnitude of the magneto resistance effect of said first structure." Further, the Examiner has not provided any evidence supporting the assertion that "it is inherently the case that the second structure will not substantially influence the MR effect of the first structure" (Office Action, page 6, lines 3-5). Accordingly, Applicant submits that claim 16 is allowable.

Applicant respectfully submits, therefore, that all pending claims 1-4 and 6-16 are in condition for allowance.

If the Examiner believes that anything further is necessary to place the application in condition for allowance, the Examiner is requested to contact Applicant's undersigned attorney at the telephone number listed below.

Dated: 11/11/02

Respectfully submitted,

  
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DOCKET NO. PHNL000094

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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|--|---|---------------------|
| Applicant(s): Lenssen                          | ) | Examiner: Dolan, J. |
|  | ) |                     |
| Application No.: 09/801,630                    | ) | Art Unit: 2652      |
|  | ) |                     |
| Filed: 03/08/2001                              | ) |                     |
|  | ) |                     |
| For: Magnetic Device with a Coupling Layer and | ) |                     |
| Method of Manufacturing and Operation of       | ) |                     |
| such Device                                    | ) |                     |

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Box Non-Fee Amendment  
Commissioner for Patents  
Washington D.C. 20231

SEPARATE MARKUP SHEET

In the Claims

Please amend claims 12, 15, and 16 as follows:

12. (Amended) A system as recited in claim 1 wherein the set of structures is part of a magnetic memory structure [such as a MRAM structure, preferably being integrated on a semiconductor substrate].

15. (Amended) A method of tuning a magneto resistance characteristic of a magnetic system, the system comprising a set of structures including a first structure of layers including at least a first ferromagnetic layer and a second ferromagnetic layer with at least a separation layer of a non-magnetic metallic material therebetween, said first structure having at least said magneto resistance characteristic, the method comprising the steps of:

- defining a layer of a high-resistive metallic material on said first structure; and
- defining a second structure including at least one magnetic layer on said layer of said high-resistive metallic material, said second structure [said second structure] including at least one magnetic layer or a set of layers for influencing at least one intrinsic magnetic characteristic of said first structure, wherein said magneto resistance characteristic can be tuned by adjusting a thickness of the high-resistive metallic material.

16. (Amended) A magnetic system [such as data storage system or a sensing system of a magnetic characteristic], the system comprising a set of structures including:

- a first structure of layers including at least a first ferromagnetic layer structure and a second ferromagnetic layer with at least a separation layer of a non-magnetic material therebetween, said first structure having at least a magneto resistance effect;
- a second structure including at least one magnetic layer, said second structure influencing at least one intrinsic magnetic characteristic of said first structure;
- said second structure being separated from said first structure by at least a spacer layer of a high-resistive metallic material and said spacer layer of a high-resistive metallic material furthermore influencing the coupling of said second structure on said first structure while not substantially influencing the magnitude of the magneto resistance effect of said first structure; and wherein

- said first ferromagnetic layer structure and said second structure respectively comprising an even or odd number of non-abutting ferromagnetic layers and an odd or even number of non-abutting ferromagnetic layers.